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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/735,078

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Bruce H. Weiller

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09/05/2006

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EXAMINER

OLSEN, KAJ K

ART UNIT

PAPER NUMBER

1753

DATE MAILED: 09/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/735,078

Applicant(s)

WEILLER ET AL.

Examiner

Kaj K. Olsen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_\_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11 is/are allowed.
- 6) ☒ Claim(s) 1,2,4-10 and 12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 2, 4-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al (USP 2003/0137083) in view of Reneker (Nanotechnology 7 (1996), pp. 216-223) and Shiell (USP 4,267,506). Reneker is being cited and relied on for the first time with this office action. Its use here was necessitated by the applicant's amendment to the claims.

4. Ko discloses a formation of a film of conductive polyaniline nanofibers for use for devices such as sensors or actuators. See paragraph 0016. Ko further discloses monitoring the resistivity of the film via a four-point probe. See paragraph 0020. Ko does not disclose any structure for this four-point probe. Shiell discloses a conventional four-point probe known in the

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art. It comprises four terminals that are placed on the surface of the device being monitored. See fig. 8 and col. 5, ll. 34-56. Utilizing a four-point probe, like that shown by Shiell, across the surface of a film of Ko would read on the claimed “positive terminal” and “negative terminal” with a film of conductive polymer nanofibers extending between the terminals. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize a four-point probe, like that taught by Shiell, for the film of Ko because Ko explicitly suggested doing so for the purpose of monitoring the resistivity of the film.

5. With respect to the new limitation requiring the conductive polymer to “consist of a single polymer,” Ko relies on a blend of polymers that would free of this limitation. However, Ko acknowledged that the use of electrospinning of polymers was already old in the art. In particular, Ko acknowledged that Reneker had previously electrospun conductive polymers such as unblended polyaniline. See Ko, paragraph 0007. See also Reneker, p. 221, col. 1, fourth paragraph and Table 1 on p. 222. Although Ko preferred polymer blends, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize to utilize a single polymer as the nanofiber polymer film because taking a step back in the art requires only routine skill in the art.

6. With respect to the sensor being for the sensing of chemical vapor, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. With respect to the film “producing a change in conductivity between the positive and negative terminals,” this is an inherent property of polyaniline nanofibers as evidenced by the instant invention.

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7. With respect to the specified chemical vapor, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability.
8. With respect to the use of gold, gold would have been an obvious choice of probe material (at least as a coating) owing to the high conductivity and inertness of gold as well as its softness that would allow good electrical connection.
9. With respect to the various claims concerning diameter, length, and distributed diameter, Ko urges that the parameters for electrospinning can be varied to control these various fiber properties. See paragraph 0015. Varying these parameters to arrive at a film having these fiber properties would have required only routine skill in the art. See also section 2, pp. 219 and 220 and fig. 3 of Reneker.
10. Claims, 1, 2, 4-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reneker in view of Ko and Shiell.
11. Reneker discloses a formation of a film of conductive polyaniline nanofibers. See fig. 1, p. 221, first column, fourth paragraph and table 1 on p. 222. Because Reneker does not teach blending this polyaniline with any other polymer, Reneker reads on the conductive polymers consisting of a single polymer. Reneker does not explicitly disclose having this film extend between positive and negative terminals. However, the teaching of Ko suggests doing resistivity analysis of a prepared conductive polymer films via a four-point probe. See paragraph 0020. Shiell discloses a conventional four-point probe known in the art. It comprises four terminals that are placed on the surface of the device being monitored. See fig. 8 and col. 5, ll. 34-56. Utilizing a four-point probe, like that shown by Shiell, across the surface of a film of Reneker

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would read on the claimed “positive terminal” and “negative terminal” with a film of conductive polymer nanofibers extending between the terminals. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize a four-point probe, like that taught by Ko and Shiell, for the film of Reneker in order to determine the conductivity properties of the polymeric film.

12. With respect to the sensor being for the sensing of chemical vapor, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. With respect to the film “producing a change in conductivity between the positive and negative terminals,” this is an inherent property of polyaniline nanofibers as evidenced by the instant invention.

13. With respect to the specified chemical vapor, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability.

14. With respect to the use of gold, gold would have been an obvious choice of probe material (at least as a coating) owing to the high conductivity and inertness of gold as well as its softness that would allow good electrical connection.

15. With respect to the various claims concerning diameter, length, and distributed diameter, varying these parameters to arrive at a film having these fiber properties would have required only routine skill in the art. In addition, see section 2, pp. 219 and 220 and fig. 3 of Reneker.

16. Claims 1, 2, 4-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al (USP 2003/0217928) in view of Marsoner et al (USP 5,130,009).

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17. Lin discloses a sensor comprising a positive terminal 12 and a negative terminal (13 or 14). Because Lin is disclosed as a sensor (see fig. 5 and paragraphs 0093-0095), these terminals are clearly adapted for interconnection to the electrical monitor. Lin further discloses the presence of a film of conductive polymer nanofibers on one of the terminals (i.e. electrode 12) of the sensor. See paragraphs 0078-0080. This does not read on the claim limitation requiring the film to extend between the positive and negative terminals. However, it is conventional to the sensing art to locate a counter or reference electrode directly across from the working electrode. This is demonstrated by Marsoner, which shows that the reference electrode 23 is placed directly across from the working electrode 13 so as to reduce the electrochemical volume of the sensor cell. See fig. 1 and col. 2, ll. 35-42. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Marsoner and place one or both of the reference and/or counter electrodes across from the working electrode so as to reduce the electrochemical volume of the sensor. Placing either the counter or reference electrode of Lin across from the working electrode would then thereby read on having the film extend between the positive and negative terminals. With respect to the use of the device for sensing a chemical vapor, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. With respect film producing a change in conductivity between the positive and negative terminal, Lin utilizes polyaniline like the instant invention and the instant invention evidenced that polyaniline inherently produces a conductivity change.

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18. With respect to the new limitation requiring the conductive polymer nanofibers consist of a single polymer, Lin does not specify that the polyaniline is blended with any other component, so the examiner will presume the nanofibers consist of the single polymer polyaniline.

19. With respect to the use of gold, see paragraph 0042 of Lin.

20. With respect to the choice of chemical vapor, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability.

21. With respect to the choice of diameters and range of the diameters, controlling the various lengths, diameters, and distributed diameters to arrive at the desired sensing qualities for the sensor requires only routine skill in the art.

***Allowable Subject Matter***

22. Claim 11 is allowed for the reasons set forth in the previous office action for claim 3.

***Response to Arguments***

23. Applicant's swearing behind with regards to the teachings of Briseno, Pinto, Yun and Liu is persuasive and the examiner has withdrawn the use of those teachings against the claims.

24. Applicant's arguments filed 6-23-2006 have been fully considered but they are not persuasive. With respect to the rejections, applicant urges that neither Lin nor Ko teach a process that produces a film that "bridges the gaps between the conducting terminals". First, applicant is not claiming this. Claim 1 only calls for a "film of organic polymer nanofibers *extending between* the positive and negative terminal" (emphasis added). "[E]xtending between"



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does not mean the same thing as “bridging the gaps”. In particular, extending between merely sets forth that this polymer film is somewhere between the positive and negative terminals and to infer that this language requires a bridging of the terminals would unfairly limit the scope of the applicant’s claims. Second, even if the examiner were to read “extending between” as being synonymous with “bridging the gaps”, the rejection relying on Ko and Shiell (modified above for the new limitation of claim 1) would still meet this limitation because the examiner was reading the electrodes of the four point probe as the positive and negative terminals of the claims. When a four-point probe is utilized across a conductive or potentially conductive material, these probes must touch the material itself. In other words, when this probe of Shiell (or any four-point probe for that matter) is utilized across the nanofiber film of Ko, the nanofiber film must bridge the gaps between the various terminals of the four-point probe. Otherwise, the resistivity of the film could not be monitored.

25. Applicant also urges that Lin and Marsoner would only work in solution. However, as the examiner clearly stated in the previous office action, the intended use of the specified claim structure has not been given further due consideration. Moreover, this argument appears to rely on applicant’s early suggestion that Lin and Marsoner would not bridge the gaps between the terminals. As discussed above, this is not what the applicant is currently claiming and the examiner has made no inference of such a limitation.

26. Applicant also urges that there is no indication as to what parameters either Ko or Lin could utilize to arrive at the parameters of claims 6-10. This would appear to be contradicted by the new teaching Reneker, which teaches the use of electrospinning (a technique suggested by

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both Ko and Lin) to create fibers ranging from 40-2000 nm (see section 2.3). Moreover, Lin already disclosed the use of fibers overlapping the claimed ranges (see paragraph 0080).

### ***Conclusion***

27. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Friday from 8:00 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753  
August 31, 2006



**KAJ K. OLSEN**  
**PRIMARY EXAMINER**